On the Law of Increase of the Population of England during the last 100 *years. By* T. R. EDMONDS, ESQ., *Actuary of the Legal and General Life Assurance Society.*

THE increase of a population may be ascertained from periodic enumeration of the number living. It may also be ascertained from records of births and deaths, since the excess of births over deaths commonly represents the increase of the population. It is on the combination of these two modes of observation that the conclusions hereafter obtained will be founded.

In the case of England (with Wales), we have on record the results of six enumerations of the living made at decennial intervals, the last having been made in the present year (1851). We have also on record the number of births and deaths for each, for the seventy years beginning with 1781 and ending with 1850, together with a record of births and deaths for every tenth year from the year 1760 to the year 1780 inclusive. It is true that portions of the series of births and deaths are defective through omissions, but it will be seen that these omissions may be supplied without leaving a margin of probable error of any significant amount.

A considerable portion of the male population of England is engaged in maritime and military service at home or abroad. The proper addition to be made on this account to the resident male population is not easily to be ascertained with exactitude. This defect is, however, of very little moment in an inquiry of the present nature, as the law of increase of the male follows closely that of the female population, for the determination of the latter of which there exist in England sufficient materials. For these reasons the following remarks and observations will be confined exclusively to the female population of England.

The first of the six decennial censuses of the population of England took place in March 1801, the last in March 1851. By comparing the numbers living at the end, with the numbers living at the beginning, of each decennial period, we may deduce the mean annual rate of increase of the population during each of the five decennial intervals. The observed mean annual rate of increase of the female population during the ten years 1801-1811, was 1·32 per cent., or 132 per ten thousand. The observed mean annual rates of increase per ten thousand during the remaining four

decennial periods, were 151, 149, 133, and 121 respectively. These five numbers form part of an ascending series for the first two terms, and part of a descending series for the succeeding three terms. The observed rate of increase was at a maximum near the end of the year 1820; such rate of increase was increasing before and decreasing since that time. It will be found that the above numbers approach very nearly to numbers which would have been exhibited if the increase of the population had been uniform, and subject to a simple and well-defined law. The five numbers founded upon such a law, are 134, 149, 149, 134, and 121 respectively, which differ from the five observed numbers in a degree which is hardly appreciable if account is taken of the probable errors of observation.

The terms of the above series have been deduced from the following law. The annual rate of increase of the population at the end of the year 1820 was 156·1 per ten thousand; and the rate of increase was accelerated up to that time, and retarded after that time, in the constant proportion of 111 to 100 for every interval of 10 years. The varying rates of increase are in two geometrical progressions, of which the common ratios for intervals of 10 years are 1·11, and the reciprocal of 1·11 respectively. By applying this law, it is found, as shown in Table II., that assuming the theoretical and the observed numbers to be the same at the time of the census of 1851, the observed numbers of the female population at the five other censuses do not differ so much, on an average, as one per thousand, from the theoretical numbers living. This close coincidence between theory and observation gives to the English population returns a valuable support, not before attained by any similar statistical records.

The first portion of the theoretical table of an increasing population, as derived from the censuses, extends over a period of 20 years only, viz., from 1801 to 1821. It becomes then an interesting subject of inquiry, whether there exist materials for determining the continuity or the discontinuity of the law retrospectively from the year 1801 into the preceding century. Such materials are found to exist in the published records of baptisms and burials of the English population, applicable to the whole of the last century. The published numbers require a correction, the baptisms and burials being both deficient; the former, however, being much more deficient from the true number of births, than the latter are from the true number of deaths.

To determine the per centage additions proper to be made to

the baptisms and burials, we have the observed mortality of the English population according to age during the 18 years 1813-30, and during the 7 years 1838-44, the observed number of children living under the age of 5 years at the censuses of 1821 and 1841, and the registered number of baptisms in the five years preceding 1821 and the five years preceding 1841. The resulting correction hence deducible is, that assuming 5 per cent. to be the proper addition to convert the registered church burials into the true number of deaths for the decennial period ending with the year 1820, 20 per cent. will be the proper addition to make to the registered baptisms, in order to convert them into numbers representing the true number of births of the population of England. The excess of births over deaths thus obtained represents nearly the observed increase of the population from 1801 to 1821, as may be gathered from inspection of the 4th and 5th columns of Tables IV. and V. The rates of addition or correction now mentioned have been applied to all the registered baptisms and burials from the year 1700 to the year 1820.

In these Tables, IV. and V., will be seen for decennial periods, from 1740 to 1820, a comparison of the excess of births or increase of population thus obtained, with the increase deduced from the law of increase observed to exist from 1801 to 1821, and continued retrospectively to the year 1740. It will be there seen that during the four decennial periods, beginning with 1781 and ending with 1820, whereof the baptisms and burials are recorded for every year, the coincidence is very close between the corresponding terms of the two series compared. From 1740 to 1780, whereof the baptisms and burials are given for every 10th year only, the coincidence is as close as could be expected if the law of increase had been admitted to hold good. It is only at the decennial interval from 1731 to 1740 that there commences any appearance of discontinuity in the law of increase. At this period, however, (or rather at the year 1730,) the mortality of the English population had obtained a maximum, when, as is highly probable, the law of increase experienced a sudden change, in the same manner as the law of increase experienced a sudden change near the end of the year 1820, shortly before which time the mortality had arrived at its minimum. In order to show that the present theory of the regular increase of the English population does not lead to results materially differing from other results obtained without the assistance of any law or formula, it may be interesting to state that the Registrar General has estimated the amount of the female popula-

tion of England at the end of the year 1760 at 2,927,817.* In the Theoretical Table III., hereunto annexed, it will be seen that 3,046,306 was the number existing at that time, if the law of increase had been uniform from the year 1760 to the year 1820.

From the year 1821 to the year 1850, the requisite corrections for the births and deaths differed considerably from the requisite corrections for periods antecedent to 1821. The deficiencies in the registered baptisms and burials were increasing during the 20 years ending with 1840; and from 1841 to 1850 the births and deaths are no longer taken from the church registers, but are taken from the numbers recorded by the Registrar General. It has been assumed, for the purpose of completing the latter portion of Tables IV. and V., hereto subjoined, that the proper addition to the registered burials of the 10 years ending with 1830, and the 10 years ending with 1840, were 6 per cent. and 8 per cent. respectively. It has also been assumed that the proportionate correction for the baptisms was four times that for the burials, as had been assumed for all the years preceding 1821. The baptisms for the two periods of 10 years ending with 1830 and 1840 were consequently increased 24 per cent. and 32 per cent. respectively. For the 10 years ending with 1850, the deaths are the numbers recorded by the Registrar General, without any increase or correction. The births are the numbers derived from increasing the registered number of births by 9 per cent.

The minor defect from omissions in the registration of deaths in all returns made previous to the year 1838 (when the new Registration Act came into full force), and the greater defect in the registration of births in all returns up to the present time, do not, I conceive, sensibly affect the value of the conclusions herein deduced. In general, the proportional omissions of births or deaths for long periods of time, and under the same system of registration, continue very nearly the same; and the rate of omission or deficiency commonly admits of being ascertained at some periods whence the rate for all periods may be inferred. It is to be remarked, that the defect in observation is not confined to births and deaths only, but extends also to the census, or enumeration of the living population. There have not been wanting English writers who have denied altogether the truth of the evidence furnished in the English population returns of the increase of the population. Their argument was, that the omissions of recent enumerations being less than the omissions of remote enumerations

* See 8th Annual Report, page 30, octavo edition.

would account for the whole of the apparent increase of population. One of the best answers which can be made to this argument is the fact that the increase of the population shown by the different censuses agrees nearly with the increase indicated by the excess of births over deaths.

It would be interesting to know what may have been the probable per centage of omissions in the enumeration last made (1851) of the living population of England. In the formation of an estimate of this amount we have, I believe, nothing to assist us beyond the estimate made for Belgium by M. Quetelet, the astronomer royal, and superintendent of the census of the population of that country. That gentleman entertains the opinion, founded upon local re-examination, that 1 in 65 (say 15 per thousand) of the living population of that country escapes enumeration, notwithstanding the greatest precautions taken by the officials to ensure accurate returns. This statement of M. Quetelet was made by him at a meeting of the London Statistical Society in June 1851, at which were present Mr. Kennedy, superintendent of the United States' census of 1850, and Mr. Farr, one of the commissioners of the English census of 1851. At that meeting excellent addresses were delivered by the representatives of these censuses, in which were detailed the modes of proceeding adopted in the respective countries, with a view to obtain useful and correct information. After these addresses, and various questions and answers arising thereon, there appeared to be no impression left on the minds of the members present, that the acknowledged defect in the result of the Belgian enumeration was attributable to any cause to which the English and American enumerators were not alike subject.

The law of increase now exhibited for the English population is the next in order of simplicity to the law commonly assumed to regulate an increasing population. The common assumption is, that the number of living increase in a geometrical progression,—that is to say, that taking equal intervals of time, the ratio of one term to the next preceding term is constant or common to all the terms. This law is applicable to all populations in which the rate of increase is constant. In England the rate of increase is variable, whilst the law of variation is of the simplest kind. When the rates of increase at the beginning and end of any interval of time are known by observation, the rate of increase at any intermediate portion of that interval is known by calculation. The law of variation is that other successive rates of increase at equidistant

intervals are themselves in geometrical progression, the common ratio of the terms being represented here by the quantity (p). In the English population, the value of the quantity for intervals of 10 years, from 1740 to 1820, is found to be 1·11, whilst the value of (p) for equal intervals, from 1820 to 1850, is found to be $\frac{1}{1\cdot11}$, or ·9009008. By means of this law, and a formula thence derived, the amount of the population at any time may be directly obtained. In Table III. the female population of England existing according to this law are exhibited at successive intervals of 10 years, from the year 1740 to the year 1850. In this table it will be perceived that the differences of the logarithms of the number living are in geometrical progression.

The law of increase now described is of the same nature as the law of decrease which pervades all tables of human mortality, from birth to extreme old age. The two laws differ from each other only in this, that the numbers which are positive or increasing in the former, are negative or decreasing in the latter,—the reasoning connected with the characteristic quantity (p), above mentioned, being in other respects precisely the same in both cases. In human mortality, the law of decrease according to age is regulated by three ascertained values of (p), each extending over a well-marked period in the life of man. The three values of (p) for annual intervals are, $\frac{1}{1.47911}$, 1·0299117, and 1·0796923: the first prevailing from birth to about 9 years of age; the second, from puberty to about 54 years of age; and the third prevailing from the age of 54 to the most advanced age of human life. If the existence of these numbers had not been proved, the great probability of the existence of three similar numbers might be inferred from the fact, that by their means is constituted the simplest law that could be devised for the continuance of human life, if we assume to be insuperable the universal weakness of life at birth, which is represented by a mortality rarely less than 30 per cent. per annum. For the exact number adopted no cause is yet assignable; but there is every reason to expect that the number adopted in one case should be adopted universally. The existence of the law of human mortality was indicated 70 years ago in general terms by Dr. Price, in the following observations on the registers of mortality for the parish of Holy Cross, near Shrewsbury: "These registers represent human life, in conformity to other observations, as particularly weak in the first month, and from

that age as growing gradually stronger, till at 10 it acquires its greatest strength, which it afterwards loses, but more slowly, till 50, and after 50 more rapidly, till at 70 or 75 it is brought back to all the weakness of infancy." In this description of the universal law of human mortality, there is nothing wanting but the numerical values of the three expressions, "growing gradually stronger," "losing strength more slowly," and "losing strength more rapidly."

In the case of the law of increase of the population of England, the value of the characteristic (p) is 1·01049 for annual intervals from the year 1740 to the year 1820. This quantity may be taken to represent during that period the annual acceleration of the progress of national improvement in the production of food. Similarly the value of the characteristic for the 30 years from 1820 to 1850, which is $\frac{1}{1\cdot01049}$, may be taken to represent during that period the annual retardation of the national progress of improvement. There is apparently no ground for surprise in the fact, that the growth of a large population enjoying good institutions of great stability, and suffering from no wars on their own soil, should be so regular for a great extent of time as to be capable of indication by a fixed number, (p). It is, however, calculated to excite surprise, that when a change occurs in the progress of improvement of the population, the new law of progress should be indicated by a number which is the reciprocal of the previous number. It is also remarkable that the sudden change for the worse in the progress of improvement should have occurred immediately after the cessation of a long war, maintained by England at a vast expenditure of money and a small expenditure of blood. It is also a singular coincidence, that the cessation of the war should have been contemporaneous with the attainment by the population of England of the minimum rate of mortality, towards which it had been gradually advancing for the previous 85 years.

On inspection of Table V., it will be seen that the rate of increase of the population for successive periods of 10 years is closely connected with the variations in the rate of mortality. From the year 1740 to the year 1820, the increase of the population may be said to be mainly derived from the decrease of the mortality. The rates of births decreased in that period of 80 years from 3·88 to 3·337 per cent. per annum; whilst the rate of deaths decreased in the same time from 3·22 to 1·85 per cent. per annum. From 1820 to 1850 the rate of births had been nearly constant,

whilst the rate of deaths has been increasing at the rate of 5 per cent. every 10 years. During this latter period the retardation of increase of population is almost identical with the rate of increase in the deaths.

On inspection of the same Table V., it will be further seen that the mortality of the English population was at a maximum about the year 1730, whence it descended by rapid steps until it arrived at a minimum about the year 1816. From the year 1816 to the year 1850, the rate of mortality has been increasing; but the rate of its increase has been only one-half as great as the previous rate of decrease of mortality. The maximum mortality in 1730 was just double of the minimum mortality in 1816. It is not, however, hence to be inferred that the mortality at every age of life was reduced one-half in the 85 years mentioned. Against such an inference, we have in the population of Sweden the example of a considerable reduction of the total mortality at all ages, combined with an increase of the mortality in all parts of the population aged above 50 years. With regard to the population of England, it is highly probable that the great reduction in the total mortality was affected without any material change in the mortality above 55 years of age,—that a small portion of the reduction was applied to lives between 10 and 55 years of age, and that the greatest portion of the reduction was applied to the class of lives under 10 years of age. It is highly probable that the reduction of mortality observed was made by a slight change in the limits of the periods of life over which the three constants above mentioned preside, the mortality at the higher ages experiencing no change. The observed facts would be fully accounted for by a retrocession of the limit of senescence from the age of 57 to the age of 53 years, and by the retrocession of the limit of infancy from $9\frac{1}{2}$ to $7\frac{1}{2}$ years.

The probability of such a change of limits having formerly occurred, will be readily seen on inspection of Table VI., wherein is exhibited the result of observations in the mortality of the female population of England at two periods, of which the middle years were 1821 and 1841 respectively, near which observations are placed for comparison the Carlisle observation of Dr. Heysham, and a theoretical table deduced from the three constants, which I have named "Village Mortality." It will be therein seen that the mortality of the English population under the age of 10 years had greatly increased in the 20 years from 1821 to 1841, whilst the mortality at ages above 20 years had remained unchanged. The increase observed under 10 years of age corresponded with an

advance of about 8 months in the limit of infancy, this limit having been in 1821 at the age of $7\frac{1}{2}$ years, whilst in 1841 it was a little above the age of 8 years. The movement of the limit of infancy observed to accompany the recent increase of the mortality of the English population may be fairly presumed to have accompanied (though made in an opposite direction) the increase of the general mortality observed previous to the year 1816. The movement of the limit of senescence between the years 1780 and 1820 may be seen on comparing the English Table with the Carlisle Table between the ages of 40 and 60 years. In the Carlisle Table the mortality between 50 and 60 is only *one-third* part greater than the mortality between 40 and 50; whilst in the total English female population at these ages the similar excess is *one-half*,— which indicates the earlier passage in 1821 of the limit of senescence, the mortality increasing much faster from the time of the attainment of that limit. With respect to the theoretical Village Table now mentioned, it may be observed that it agrees with the Carlisle Table closely in adult life, except at the decennial ages 50 to 60 and 90 to 100. In both these instances the two observations on the total female population of England agree with the theoretical table, and disagree with the Carlisle Table.

In the theoretical Table III., representing the increasing female population of England as existing on the last night of December in every 10th year, from the end of the year 1740 to the end of the year 1850, the successive steps of construction are exhibited, commencing from the last column. This column contains the logarithms of the logarithms of the ratios of every two consecutive numbers of living. The last column but one contains the logarithms of these ratios, and is of precisely the same nature as the logarithm of probability of surviving one year, usually represented by log. $_1a$, and constantly occurring in the use of all tables of mortality. The numbers in this column have been obtained from the formula

$$\log._1 y = \frac{k^2 a(1-p^r)}{\log. p} p^x,$$

which formula has been obtained in the following manner:—

Let (a) represent the rate of increase of the population continued uniform for a unit of time (here taken to be 10 years), and existing at a fixed period, here taken to be the end of the year 1820, its value being ·1561. Let the quantity (p) represent the

retardation of increase in a unit of time, being equal to $\frac{1}{1{\cdot}11}$ (=·9009008, log. p=−·0453230), measured in either direction from the end of the year 1820. Let (k) (=·4342945) be the modulus of the common system of logarithms, being such that $k \times$ hyperbolic logarithm = common logarithm. Let also (y) be taken to represent the variable number of living corresponding to the variable term (x).

It is evident that the rate of increase of population at the end of any time (x) will be represented by ap^x, the population at the same time being (y). The uniform increase of the population in the unit of time will then be $=y \times ap^x$, and the increase in an indefinitely small time (dx) will be $=yap^x dx$, that is $dy=yap^x dx$, or $\frac{dy}{y}=ap^x dx$; whence by integration, hyp. log. $y=\frac{ap^x}{\text{hyp. log. } p}+c$, or log. $y=\frac{k^2 a}{\log. p}+c'$, on converting hyperbolic into common logarithms.

The value of c', and consequently of log. y, may be readily obtained, but the result would be of little practical value in the construction of tables of mortality or population. It is only the differences between successive values of log. y, or values of log. y that are wanted, the values of the former being deduced from the latter by simple addition.

Returning to the last formula, and taking (y_x) and (y_{x+1}) to represent two consecutive values of (y), corresponding to the times (x) and ($x+1$) respectively, x being a whole number or 0, we get

$$y_x=\frac{k^2 a p^x}{\log. p}+c'; \text{ and } y_{x+1}=\frac{k^2 a p^{x+1}}{\log. p}+c';$$

whence by subtraction we get

$$\log y_{x+1}-\log. y_x=\frac{k^2 a}{\log. p}(p^{x+1}-p^x)=\frac{k^2 a(p-1)}{\log. p}\times p^x;$$

which formula is identical with the formula first mentioned, with corrections only of the signs of ($p-1$) and log. p, which are both negative, since (p) in this case is less than unity. The successive values of log. log. $_1a$ in the last column of the table are obtained by successive additions of log. $p=\pm$ ·0453230.

The following is a type of the calculation of the tabulated numbers in the instance of both of the first intervals of 10 years in the

two series, beginning with the end of the year 1820, the successive steps in the two series being the same.

$$\begin{aligned}
\log.\ k^2 &= \log.\ \cdot4342945^2 = \bar{1}\cdot2755686\\
\log.\ a &= \log.\ \cdot1561 \quad\ = \bar{1}\cdot1934029\\
\log.\ (1-p) &= \log.\ \cdot0990992 = \bar{2}\cdot9960702\\
&\qquad\qquad\qquad\qquad \text{sum logs.}\ \bar{3}\cdot4650417\\
\log.\ (\log.\ p) &= \log.\ \cdot0453230 = \bar{2}\cdot6563186\\
\log.\ {}_1a &= \log.\ \cdot0643759 = \bar{2}\cdot8087231
\end{aligned}$$

TABLE I.—*Showing the Dates of the several Censuses of the English Population, the Intervals in Time between the consecutive Censuses, and the Mean Annual Rates of Increase of the Female Population in the Intervals between consecutive Censuses.*

Date of Census.	Interval in Days from last night of preceding year.	Interval in Years between this and the next enumeration.	Mean Annual Rate of Increase between the two enumerations.	
			According to Observed Numbers.	According to Theoretical Numbers.
1801, March, 10th day....	68·5	10·21370	·013181	·013444
1811, May, 27th day	146·5	10·00274	·015083	·014933
1821, May, 28th day	147·5	10·00548	·014915	·014933
1831, May, 30th day	149·5	10·02055	·013325	·013444
1841, June, 6th night	157·0	9·81371	·012148	·012103
1851, March, 30th night ..	89·0			

TABLE II.—*Showing the Observed Numbers of the Female Population of England at each of the Six Censuses; showing also the Theoretically-deduced Population at the same times; and the Rates of Deviation per Thousand between the two series of Numbers.*

Census of Year.	Addition for time, from 31st December preceding.	Theoretical Number Living, (including foregoing addition.)	Number of Living observed at Census.	Difference between Observed and Theoretical Numbers.	Rate of Deviation per Thousand.
1801	10,961	4,620,993	4,627,867	− 6,874	1·49
1811	29,739	5,298,400	*5,290,153	+ 8,247	1·56
1821	38,546	6,149,037	6,144,709	+ 4,328	·70
1831	40,821	7,127,651	7,125,835	+ 1,816	·25
1841	44,138	8,143,454	8,136,562	+ 6,892	·85
1851	25,420	9,160,180	9,160,180		

* Error of 6,934 in Population Returns of 1811 here corrected.

TABLE III.—*Showing the Mode of Derivation of the Theoretical Numbers Living at duennial intervals from* 1740 *to* 1860*: the Theory being that the Annual Rate of Increase of Population at the end of the Year* 1820 *was* ·01561*, and that such Rate decreased from that time, in either direction, in the proportion of* 111 *to* 100 *for every period of Ten Years.*

End of Year.	Number Living.	Log. Living.	Log. $_1a$.	Log. Log. $_1a$.
1740	2,620,284	6·4183484	·0310072	$\bar{2}$·4914621
1750	2,814,204	·4493556	·0344180	·5367851
1760	3,046,306	·4837736	·0382039	·5821081
1770	3,326,423	·5219775	·0424064	·6274311
1780	3,667,616	·5643839	·0470711	·6727541
1790	4,087,475	·6114550	·0522489	·7180771
1800	4,610,032	·6637039	·0579963	·7634001
1810	5,268,661	·7217002	·0643759	·8087231
1820	6,110,491	·7860761	·0643759	·8087231
1830	7,086,830	·8504520	·0579963	·7634001
1840	8,099,316	·9084483	·0522489	·7180771
1850	9,134,760	·9606972	·0470711	·6727541
1860	10,180,481	7·0077683		

TABLE IV.—*Showing the Annual Births and Deaths of Females in England, for periods of Ten Years, from* 1700 *to* 1850*; also showing the Annual Excess of Births over Deaths compared with Annual Increase of Population, derived from preceding Table; also showing the Mean Annual Number of Marriages, in periods of Ten Years, from the Year* 1761.

Ten Years.	Annual Births.	Annual Deaths.	Annual Excess of Births.	Annual Increase of Population from Theoretical Table.	Annual Marriages.
1701 to 1710	88,612	74,230	14,382		
1711 „ 1720	89,220	80,906	8,314		
1721 „ 1730	95,738	90,521	5,217		
1731 „ 1740	99,720	92,693	7,027		
1741 „ 1750	105,432	87,332	18,100	19,392	
1751 „ 1760	111,414	84,412	27,002	23,210	
1761 „ 1770	119,814	90,327	29,487	28,012	59,463
1771 „ 1780	130,470	100,106	30,364	34,119	62,489
1781 „ 1790	140,664	100,057	40,607	41,986	69,039
1791 „ 1800	153,840	102,381	51,459	52,256	73,601
1801 „ 1810	169,228	101,698	67,530	65,863	83,215
1811 „ 1820	190,861	104,851	86,010	84,183	91,043
1821 „ 1830	227,670	128,450	99,220	97,634	105,210
1831 „ 1840	257,800	155,600	102,200	101,249	118,963
1841 „ 1850	291,582	185,745	105,837	103,544	135,499

TABLE V.—*Showing, for periods of Ten Years, from* 1700 *to* 1850, *the Annual Rates (per Cent.) of Births and Deaths of the Female Population of England; also showing the Annual Excess of Rates of Birth for comparison with the Theoretical Annual Rates of Increase of Population from the Year* 1740, *and with the Observed Annual Rates of Increase from the Year* 1800.

Ten Years.	Per Centage of Births.	Deaths.	Annual Excess of Births.	Theoretical Annual Rate of Increase.	Observed Annual Rate of Increase.	Annual Marriages to 100 Females living.
1701 to 1710	3·78	3·17	·61			
1711 „ 1720	3·63	3·29	·34			
1721 „ 1730	3·79	3·58	·21			
1731 „ 1740	3·85	3·58	·27			
1741 „ 1750	3·88	3·22	·66	·72		
1751 „ 1760	3·80	2·88	·92	·80		
1761 „ 1770	3·76	2·83	·93	·88		1·86
1771 „ 1780	3·73	2·86	·87	·98		1·79
1781 „ 1790	3·63	2·58	1·05	1·09		1·78
1791 „ 1800	3·54	2·36	1·18	1·21		1·69
1801 „ 1810	3·43	2·06	1·37	1·34	1·32	1·69
1811 „ 1820	3·37	1·85	1·52	1·49	1·51	1·60
1821 „ 1830	3·45	1·95	1·50	1·49	1·49	1·59
1831 „ 1840	3·40	2·05	1·35	1·34	1·33	1·57
1841 „ 1850	3·38	2·16	1·22	1·21	1·21	1·57

TABLE VI.—*Showing the Observed Mortality, according to Age, of the English Female Population, for two periods ending with* 1830 *and* 1844 *respectively; with which are compared the Carlisle Mortality Table for the period ending with* 1787, *and the Theoretical Table of "Village" Mortality.*

Between Ages	All ENGLAND. Females.		CARLISLE. Both Sexes.	Theoretical VILLAGE TABLE. Limits at 8 Years and 55 Years of Age.
	18 Years, 1813 to 1830.	7 Years, 1838 to 1844.	9 Years, 1779 to 1787.	
0 to 5	4·22	6·04	8·23	5·54
5 „ 10	·61	·90	1·02	·82
10 „ 15	·48	·55	·54	·54
15 „ 20	·70	·79	·64	·62
20 „ 30	·95	·94	·75	·78
30 „ 40	1·14	1·13	1·06	1·05
40 „ 50	1·37	1·32	1·43	1·40
50 „ 60	1·98	1·98	1·83	2·01
60 „ 70	3·78	3·79	4·12	4·05
70 „ 80	8·88	8·42	8·30	8·46
80 „ 90	19·67	18·32	17·56	17·16
90 „ 100	34·09	34·58	28·44	33·45
ALL AGES.	1·90	2·10	2·50	..